	Application No.	Applicant(s)
Notice of Allowability	10/619,796	CANNING, FRANCIS X.
	Examiner	Art Unit	
	HERNG-DER DAY	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *Amendment received 9/22/09.*

2. ☒ The allowed claim(s) is/are *21-24, 30, 33-37, 39, and 44, now renumbered as 1-12.*

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a) ☐ All   b) ☐ Some*   c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the
         International Bureau (PCT Rule 17.2(a)).
    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .
    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of
      Paper No./Mail Date _____ .

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)
1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
    Paper No./Mail Date *9/22/09*
4. ☐ Examiner's Comment Regarding Requirement for Deposit
    of Biological Material

5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
    Paper No./Mail Date *20091206* .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____ .

DETAILED ACTION

1.   This communication is in response to Applicant's Amendment to Office Action dated

May 22, 2009, filed September 22, 2009, and personal interview conducted December 4, 2009.

1-1.   Claims 21-24 and 33-36 have been amended. Claims 9-14, 17-20, 31-32, 38, and 40-43

have been canceled. Claims 21-24, 30, 33-37, 39, and 44 are pending.

1-2.   Claims 21-24, 30, 33-37, 39, and 44 have been examined and allowed.

Interview Summary

2.   A personal interview with the Applicant, Dr. Francis X. Canning, has been conducted on

December 4, 2009. Proposed amendments to the claims to particularly point out and distinctly

claim the subject matter and to overcome the rejections in Office Action dated May 22, 2009,

have been discussed. Furthermore, the following agreements have been reached.

         (1) Canceling claims 9-14, 17-20, 31-32, 38, and 40-43 and amending claims 21-24 and

33-36 as appeared in the Examiner's amendment below.

         (3) Allowing claims 21-24, 30, 33-37, 39, and 44 subject to update search.

Examiner's Amendment

3.   An Examiner's amendment to the record appears below. Should the changes and/or

additions be unacceptable to Applicants, an amendment may be filed as provided by 37 CFR

1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the

payment of the issue fee.

4. Authorization for this Examiner's amendment was given in a personal interview with Dr.

Francis X. Canning on December 4, 2009.

5. The claims have been amended as follows:

5-1. Cancel claims 9-14.

5-2. Cancel claims 17-20.

5-3. Replace claim 21 as follows:

21. (Currently Amended) A method of data compression in calculating an electric current,

Deleted: for data describing the strength of energy sources

comprising:

using software loaded into a computer memory attached to a computer processor to

partition a first set of basis functions into groups, each group corresponding to a region, each

basis function corresponding to an unknown in a system of equations, each of said basis

functions corresponding to an original source, wherein said system of equations models an

electromagnetic field produced at least in part by said electric current;

Deleted: each original source corresponding to an energy source;

selecting a plurality of spherical angles;

calculating a far-field disturbance produced by each of said basis functions in a first

group for each of said spherical angles to produce a matrix containing transmitted disturbances;

using said computer processor, reducing a rank of said matrix containing transmitted

disturbances to yield a second set of basis functions, said second set of basis functions

corresponding to composite sources, each of said composite sources comprising a linear

Deleted: original

combination of more than one basis functions of said first set of basis functions;

transforming said system of equations to use said composite sources to compress and

produce a transformed system of equations;

identifying a plurality of sub-matrices substantially column-wise disposed to each other

in said transformed system of equations;

operating on said plurality of sub-matrices to compute a decomposition, and wherein said

decomposition is comprised of second sub-matrices, each of said second sub-matrices

corresponding to at least one of said composite sources; and

using said decomposition by said computer processor to solve said transformed system of

equations to calculate and store said electric current.

5-4. Replace claim 22 as follows:

22. (Currently Amended) A method to compute physical interactions described by a first system

of linear equations, comprising:

using software loaded into a computer memory attached to a computer processor

partitioning a first set of basis functions into groups, each group corresponding to a region, each

basis function corresponding to one unknown in said first system of linear equations, each of said

basis functions corresponding to an original source, each of said original sources corresponding

to a physical disturbance, said first system of linear equations describing physical interactions of

at least one of an electric field, a magnetic field, a pressure, and a particle flux produced by at

least one of a distribution of electric charge, an electric current, an exciting pressure, and an

exciting particle flux;

calculating a plurality of far-field disturbances produced by each of said basis functions

in a first group to produce a plurality of transmitted disturbances;

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Deleted: linear

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Deleted: produced by reducing a rank of a matrix containing transmitted disturbances

Deleted: on a computing system

Deleted: linear

Deleted: produce the strengths of said energy sources

Deleted: describing the strengths of physical disturbances

Deleted: a processor means configured to partition

Deleted: said

Deleted: a processor means configured to calculate

using said plurality of far-field disturbances to yield a second set of basis functions, said

second set of basis functions corresponding to a plurality of composite sources, each of said

composite sources comprising a linear combination of more than one basis functions of said first

set of basis functions;

transforming interaction data describing at least a portion of said first system of linear

equations to produce a second system of linear equations using said composite sources, wherein

a portion of said second system of linear equations is compressed relative to said first system of

linear equations, said a portion of said second system of linear equations using said composite

sources, and wherein said plurality of far-field disturbances contains disturbances that are not

described by said interaction data;

storing said compressed portion of said second system of linear equations;

operating on said second system of linear equations to compute a factorization wherein

said factorization is compressed relative to said first system of linear equations;

storing a portion of said factorization; and

using said factorization to solve said first system of linear equations to compute and store

said at least one of a distribution of electric charge, an electric current, an exciting pressure, and

an exciting particle flux.

5-5.   Replace claim 23 as follows:

23. (Currently Amended) A method of using interaction data to model electromagnetic effects,

comprising:

storing said interaction data, wherein said interaction data describing interactions

involving at least one of an electric field, a magnetic field, a pressure, and a particle flux and

sources comprising at least one of a distribution of electric charges, an electric current, an
exciting pressure and an exciting particle flux;

identifying a system of equations described by said interaction data;

obtaining a plurality of far-field disturbances; using a computer to compute a
decomposition of said interaction data wherein a sub- matrix of said decomposition is
compressed, the compression of said sub-matrix is computed using only said plurality of far-field
disturbances, wherein a portion of said compressed sub-matrix is itself compressed and stored on
said computer and there are interactions in said portion that are not described by said plurality of
far-field disturbances; and

using said decomposition to compute and store a solution of said system of equations,
said solution models said electromagnetic effects between said at least one of an electric field, a
magnetic field, a pressure, and a particle flux and said sources comprising said at least one of a
distribution of electric charges, an electric current, an exciting pressure and an exciting particle
flux.

5-6.   Replace claim 24 as follows:

24. (Currently Amended) The method of Claim 23, wherein the step of using said plurality of
far-field disturbances comprises reducing a rank of said plurality of far-field disturbances.

5-7.   Cancel claims 31 and 32.

5-8.   Replace claim 33 as follows:

33. (Currently Amended) The method of Claim 22, wherein said physical disturbances comprises
a pressure field.

5-9.   Replace claim 34 as follows:

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Deleted: comprising said physical sources

Deleted: computing system

34. (Currently Amended) The method of Claim 22, wherein said physical disturbances comprise

a particle flux.

Deleted: computing system

5-10.   Replace claim 35 as follows:

35. (Currently Amended) The method of Claim 22, wherein said physical disturbances comprise

an electric current.

Deleted: computing system

5-11.   Replace claim 36 as follows:

36. (Currently Amended) The method of Claim 35, wherein said electric current is due to an

electric field and wherein said electric current produces a produced electric field.

Deleted: computing system

5-12.   Cancel claim 38.

5-13.   Cancel claims 40-43.

5-14.   Replace claim 44 as follows:

44. (Currently Amended) The method of Claim 33 wherein said pressure field describes, at least

Deleted: computing system

in part, antenna properties.

Reasons for Allowance

6.   The following is an Examiner's statement of reasons for allowance:

6-1.   The prior art does not teach or render obvious the invention as recited in independent

claims 21-23.

Specifically, independent claim 21 has identified the distinct combination of features

including "calculating a *far-field disturbance*", "reducing a rank of said matrix containing

transmitted disturbances", "identifying a plurality of *sub-matrices substantially column-wise*

disposed to each other in said transformed system of linear equations", and "said decomposition

is comprised of second sub-matrices, *each of said second sub-matrices corresponding to at least one of said composite sources*" as shown in FIG. 2, FIG. 10B, and FIG. 14, which has not been uncovered in a single teaching, nor would a modification of prior art references be obvious to one of ordinary skill in the art to yield these limitations in the context of the claim.

Independent claim 22 has identified the distinct combination of features including "calculating a plurality of *far-field disturbances*", "each of said composite sources comprising *a linear combination of more than one basis functions* of said first set of basis functions", "a portion of said second system of linear equations is *compressed*", "said plurality of far-field disturbances contains disturbances that are not described by said interaction data", and "said *factorization is compressed*" as shown in FIG. 2, FIG. 10B, and FIG. 14, which has not been uncovered in a single teaching, nor would a modification of prior art references be obvious to one of ordinary skill in the art to yield these limitations in the context of the claim.

Independent claim 23 has identified the distinct combination of features including "obtaining a plurality of *far-field disturbances*" and "a sub-matrix of said decomposition is compressed, the compression of said sub-matrix is computed using only said plurality of far-field disturbances, wherein a portion of said compressed sub-matrix is itself compressed and stored on said computer and there are interactions in said portion that are not described by said plurality of far-field disturbances" as shown in FIG. 2, FIG. 10B, and FIG. 14, which has not been uncovered in a single teaching, nor would a modification of prior art references be obvious to one of ordinary skill in the art to yield these limitations in the context of the claim.

Moreover, as stated in MPEP § 2131.02, "The identical invention must be shown in as complete detail as is contained in the ... claim." Richardson v. Suzuki Motor Co., 868 F.2d 1226,

1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an ipsissimis verbis test, i.e., identity of terminology is not required. In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). Therefore, independent claims 21-24 and their dependent claims have been allowed over the prior art of record.

7.   Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

8.   Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Herng-der Day whose telephone number is (571) 272-3777. The Examiner can normally be reached on 9:00 - 17:30.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: (571) 272-2100.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kamini S. Shah can be reached on (571) 272-2279. The fax phone numbers for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private

PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Kamini S Shah/

Supervisory Patent Examiner, Art Unit 2128

/Herng-der Day/
Examiner, Art Unit 2128

December 7, 2009